THE SECRETARY OF TRANSPORTATION

WASHINGTON, D.C. 20590

May 18, 2001

The Honorable Ted Stevens
Chairman, Committee on Appropriations
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Senate Report 106-309, which accompanied the fiscal year 2001 Department of Transportation (DOT) and Related Agencies Appropriations Bill (S. 2720), directed DOT to develop a cost-sharing plan for the operation of the Nationwide Differential Global Positioning System (NDGPS).

Following consultations between representatives from the Departments of Transportation and Commerce, and discussion with staff of the Subcommittee on Transportation of the Senate Appropriations Committee, we have jointly implemented a cost-sharing approach for funding the operation of the NDGPS and closely related systems.

The enclosed report responds to the discussion in Senate Report 106-309 concerning NDGPS cost-sharing. An identical letter has been sent to the Chairman of the House Committee on Appropriations.

Sincerely yours,

Norman Y. Mineta

Enclosure

THE SECRETARY OF TRANSPORTATION

WASHINGTON, D.C. 20590

May 18, 2001

The Honorable C. W. Bill Young
Chairman, Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Senate Report 106-309, which accompanied the fiscal year 2001 Department of Transportation (DOT) and Related Agencies Appropriations Bill (S. 2720), directed DOT to develop a cost-sharing plan for the operation of the Nationwide Differential Global Positioning System (NDGPS).

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Sincerely yours,

Norman Y. Mineta

Enclosure

Nationwide Differential Global Positioning System Cost-Sharing

Report to Congress

April 2001

Introduction

This report was prepared in response to the Senate Committee on Appropriations Report 106-309 accompanying the Department of Transportation (DOT) and Related Agencies Appropriations Bill, for the fiscal year ending September 30, 2001, (S. 2720) dated June 14, 2000. The Report stated:

> *...DOT is the only Federal agency that requests appropriated funds for the development and operation of the NDGPS system. The Committee directs that a cost-sharing plan involving at least both DOT and the Department of Commerce be developed and conveyed to the House and Senate Committees on Appropriations no later than July 31, 2000, and that this cost-sharing plan be reflected in these two departmental budget requests for fiscal year 2002.*

In response to this direction, representatives from the DOT and the Department of Commerce (DOC) conducted a series of meetings. The Departments reviewed the services provided by the Nationwide Differential Global Positioning System (NDGPS) and Continuously Operating Reference Station (CORS) system, evaluated various alternatives for sharing the cost of operations, and identified the most-efficient mechanism to fund future operations. The department representatives then met with Senate Appropriations Committee staff members on January 3, 2001, to communicate the recommended approach.

This report documents the cost-sharing evaluation and the recommended approach for funding NDGPS. This report also describes the transportation and positioning functions of Differential Global Positioning System (DGPS) sites and the closely interrelated services that support a wide variety of important public applications.

Review of Services

The Department of Transportation operates the NDGPS fundamentally as a real-time navigation and location determination system that provides the accuracy, integrity, and availability needed for transportation users, and for many other applications. In addition, integration of NDGPS with the CORS network maintained by the Department of Commerce aids in accuracy and integrity and enables more diverse applications.

The NDGPS provides information (data) available instantaneously for positioning within a few meters; CORS supports the precise positioning requirements of NDGPS sites and provides a framework from which other users extract data for more precise applications. For example, a navigator obtains accurate location coordinates using NDGPS and references the true location on a map or chart that has been facilitated by the National CORS system.

NDGPS

NDGPS is a network of ground-based reference stations providing differential corrections to the basic Global Positioning System (GPS) that is modeled after the Coast Guard's maritime differential GPS system, which covers the coastal areas and navigable waters of the United States. A DGPS reference station continuously receives GPS signals, compares the computed GPS position to precisely surveyed reference station coordinates, calculates errors in the satellite signals, and broadcasts corrections to users in the area. The user's DGPS receiver then applies the correction message to improve the accuracy of its own position. The DGPS broadcast also includes integrity warnings that identify unreliable satellite signals. Users employ these real-time corrections broadcast by radio beacons to achieve better than 3-meter accuracy. The DGPS service also provides integrity and nationwide interoperability for transportation safety related operations.

Many users need DGPS for safe navigation and accurate positioning. The U.S. Coast Guard provides DGPS in coastal areas of the continental U.S., Alaska, Hawaii, and Puerto Rico using a network of 55 sites. The Nationwide DGPS expansion plans call for 74 additional sites to assure interoperable service is available from coast-to-coast and throughout the state of Alaska. Twenty-three NDGPS sites have been funded through FY 2001. Subject to availability of funding, single station nationwide coverage should be available by 2003 and double station coverage by 2004.

NDGPS serves multiple functions, but is primarily a location determination system for transportation. The Federal Railroad Administration (FRA) has a requirement for the Nationwide Differential Global Positioning System as the basis for the location-determination system requirement for Positive Train Control (PTC) systems. PTC is an important transportation safety initiative that will prevent railroad collisions and also enhance the efficiency of the nation's railroad system.

The FRA proposes to facilitate the deployment of PTC by completing the NDGPS network, which the FRA and several railroads consider a prerequisite for PTC. PTC systems being developed for the high-speed passenger corridor between Chicago and St. Louis and for the Alaska Railroad employ NDGPS. The National Transportation Safety Board has listed PTC as one of its 10 most wanted initiatives for national transportation safety. Two Federal Advisory Committees have reviewed this issue and recommend that the FRA complete its installation of NDGPS so it is available for railroads to use for PTC. The committees are the Railroad Safety Advisory Committee and the Transportation Research Board's Committee to Review the FRA R&D Program. Specifics of how NDGPS will be used for PTC are included in Appendix A to this report.

While PTC provides the underlying transportation requirement for NDGPS, it offers numerous other transportation benefits for both the public and private sectors. A survey of State and local transportation departments identified the following additional benefits to transportation users:

- Intelligent Transportation Systems

- Geographic databases for use by emergency services
- Inventory of railroad crossings and road centerline
- Emergency response services such as police, fire, and rescue
- Automatic vehicle location for public transit and other fleets
- Snowplow guidance for low-visibility situations
- Highway inventory (milepost markers, right-of-way, guardrails and bridges)
- Tracking hazardous materials from origin to destination
- Mapping pavement condition, safety, accident, and traffic data

There are also many non-transportation benefits derived from DGPS, but no other established public agency requirement for the system.

CORS

DOC's National Oceanic and Atmospheric Administration (NOAA) coordinates a network of Continuously Operating Reference Stations connected to the National Spatial Reference System (NSRS) throughout the United States. NOAA compiles data from almost 200 sites through cooperative agreements with academic, commercial, government, and private organizations. Users employ CORS data for surveying, engineering, and geographic information systems applications. CORS data (available via the Internet) and data collected by the user are processed to compute 3-dimensional positions accurate to a few centimeters. Eleven NDGPS sites and the 50 Coast Guard maritime DGPS sites are currently part of this CORS network. Participation in the national CORS program provides precise knowledge of NDGPS site coordinates to the centimeter-level and independent monitoring of GPS data quality. CORS also provides consistency between users' derived position coordinates and transportation infrastructure coordinates.

NOAA operates the CORS system primarily for surveying. However, transportation users gain several benefits through participation in the CORS network. CORS makes the DGPS service more accurate, robust, and reliable:

- NOAA establishes precise reference coordinates relative to the NSRS for each NDGPS site. These coordinates are used to compute broadcast corrections. The NSRS is the framework for national mapping, surveying, and engineering.
- CORS regularly validates DGPS antenna coordinates and can detect antenna position movement. Any movement could be critical to the users' position determination. (For example, CORS operators helped NDGPS operators to quickly isolate DGPS antenna movement caused by a fallen tree).
- CORS improves NDGPS service integrity through redundant checks of NDGPS equipment and communications channels.

- Data from NDGPS sites contributes to highly accurate spatial reference systems, so transportation users may accurately relate their position coordinates to maps and charts.
- As part of CORS, NDGPS data is distributed to users on the Internet.
- NOAA retains a historical archive of NDGPS antenna coordinates. Operators can consult this database to identify changes over time.

Evaluation of Cost-Sharing Alternatives

As directed by the Senate report, the Departments of Transportation and Commerce have examined the various cost-sharing options for NDGPS and CORS operating costs recognizing the many benefits of NDGPS.

DOT has explored a variety of opportunities to share construction or operation costs during NDGPS development. For example, the Army Corps of Engineers provided capital funding for 20 DGPS sites for inland waterways and provides regular maintenance support for eleven of these sites. The NDGPS system incorporates coverage from these Army Corps of Engineers sites, as well as inland coverage from maritime DGPS sites. Additionally, State Governments, the Tennessee Valley Authority, and the U.S. Bureau of Land Management are contributing through land-use permits or no-cost real property leases for new NDGPS sites.

Although the NDGPS and CORS systems each have different primary functions, the services are closely interconnected and complimentary and share much of the same equipment. Alternatives such as DOC or other agencies contributing funds for NDGPS operations were not feasible because of the increased uncertainty introduced by multiple partial requests in the annual budget request process. During these discussions, it was apparent that CORS provides substantial contributions to the NDGPS service. The Department of Commerce already provides the basic CORS operating costs.

Annual operating costs for the existing 13 NDGPS sites are approximately $3M. As additional sites are constructed over the next several years, the operating costs will increase to roughly $7M for approximately 69 sites. Annual operating costs for NOAA's CORS program consisting of approximately 200 participating sites are $2M.

Effectively, the two Departments are cost-sharing already since DOT and DOC are each funding a fair portion of the combined NDGPS/CORS operation. We do not believe that additional sharing is necessary to continue to provide quality navigation and positioning services. Additional sharing partners would add additional complexity within the Administration and within Congress.

Most Efficient Funding Mechanism

The Department of Transportation will request funding for NDGPS operations in FY 2002 and the Department of Commerce will continue to request funds for CORS operations in its future budget requests. Annual operating cost of the combined systems will be approximately $5 million in FY 2001 and FY 2002; $3 million contributed from the Department of Transportation for NDGPS and $2 million contributed from the Department of Commerce for CORS. This approach is the most efficient method to maintain a continuous funding stream for an operational safety-of-life navigation service. In addition, the Department of Transportation will request capital funding; in FY 2002 $3 million is requested.

DOT is committed to providing a safe, efficient, reliable NDGPS service for transportation users. CORS is an essential component of the NDGPS, which helps achieve the desired high level of performance. The Department of Commerce is committed to providing service to the present and future NDGPS sites participating in the CORS network. Through this partnership, our consolidated system operations will continue to deliver quality services to the public.

Positive Train Control

Positive Train Control (PTC) systems are integrated command, control, communications, and information systems for controlling train movements with safety, precision, and efficiency. PTC systems will improve railroad safety by significantly reducing the probability of collisions between trains, casualties to roadway workers and damage to their equipment, and over speed accidents. In addition to providing a greater level of safety, PTC systems will also enable a railroad to run scheduled operations and provide improved running time, greater running time reliability, higher asset utilization, and greater track capacity. PTC systems are comprised of digital data link communications networks, automated means of determining train location, on-board computers on locomotives and maintenance-of-way equipment, in-cab displays, throttle-brake interfaces on locomotives, wayside interface units at switches and wayside detectors, and control center computers and displays. The positioning system for PTC must be affordable, uniform, continuous, accurate, reliable, secure, real-time, and available throughout the United States. Nationwide DGPS (NDGPS) meets all of those requirements.

Congress, for the past several years, has provided funds for a PTC project deployment on the entire 686-mile Alaska Railroad, which operates passenger, freight, and intermodal trains between Seward, Anchorage, and Fairbanks over difficult terrain in harsh weather conditions. The PTC system will supplant the railroad's current system of transmitting movement authorities by voice radio from dispatchers to train crews and track forces; the Alaska Railroad has no signals installed along its tracks. Phase I was the design, development, and installation of a computer-aided dispatching system for the railroad's dispatching center in Anchorage; Phase II was the installation of a digital data communications system along the entire railroad to supplement the voice radio communications system. Phases I and II are now complete. Phase III, the design and development of the locomotive on-board computers and track forces terminals, is now underway. Phase IV will be the full field deployment of PTC. The Alaska Railroad PTC system design will use NDGPS as the positioning system. At present, only the southern one-third of the trackage of the Alaska Railroad has NDGPS coverage. Although funding for NDGPS site installation, operations, and maintenance was not included in the funding for the Alaska Railroad PTC project, three additional NDGPS sites are scheduled for installation in 2003 (Alaska NDGPS sites have the highest construction costs).

Congress has also provided funds to the Federal Railroad Administration to enable it to join with the Association of American Railroads (AAR) to sponsor the North American Joint Positive Train Control Project. This activity will develop consensus specifications for interoperable PTC and demonstrate it in Illinois on a portion of the Chicago to St. Louis high-speed corridor over which both Amtrak passenger trains and Union Pacific freight trains operate. The Union Pacific Railroad controls this track, which they own, from their operations center in Omaha. The State of Illinois is also providing funding for the demonstration project. The project management committee includes representatives from all of the major freight railroads. The Transportation Technology Center, Inc. (a subsidiary of AAR) is administering the program; Arinc and Canac Inc. are the system-engineering firms; and Lockheed Martin Corp. is the system integrator. This PTC system

design will use NDGPS as the primary source of information on the location of trains and maintenance forces. The Illinois rail corridor currently has NDGPS coverage from two sites. Amtrak and The State of Illinois expect to begin revenue high-speed passenger service in January 2003.

U.S. Department of Transportation
Office of the Secretary of Transportation

400 Seventh St., S.W.
Washington, D.C. 20590

010501-031
CONTROL NO.

April 19, 2001

ACTION MEMORANDUM TO THE SECRETARY

From: Beverly Pheto
Acting Deputy Assistant Secretary for Budget and Programs/CFO
(x6-9603)

Prepared by: David Lippold
Program Analyst
(x6-2902)

Re: Report to Congress on Nationwide Differential Global Positioning System Cost-Sharing

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ACTION REQUIRED

Sign the attached letters to Congress transmitting the report, *Nationwide Differential Global Positioning System Cost-Sharing*.

SUMMARY

The U.S. Department of Transportation (DOT) operates the Nationwide Differential Global Positioning System (NDGPS) fundamentally as a real-time navigation and location determination system that provides the accuracy, integrity, and availability needed for transportation users, and for other applications. Following consultations between representatives of DOT and the Department of Commerce (DOC) and discussion with staff of the Subcommittee on Transportation of the Senate Appropriations Committee, the attached report has been prepared that documents the cost-sharing approach for funding the operation of NDGPS and closely related systems.

BACKGROUND

The Senate Committee on Appropriations Report 106-309 accompanying the U.S. Department of Transportation and Related Agencies Appropriations Bill, for the fiscal year ending September 30, 2001, directed that a cost-sharing plan for the NDGPS involving at least both DOT and DOC be developed and conveyed to the House and Senate Committees on Appropriations. In response to this direction, representatives at

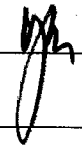
the Assistant Secretary level from both DOT and the DOC conducted a series of meetings in July and August 2000, and met with Senate Appropriations Committee staff members on January 3, 2001, to communicate the recommended approach. This report documents the cost-sharing evaluation and the recommended approach for funding NDGPS. The recommended approach for funding NDGPS is that DOT will request funding for NDGPS operations and DOC will continue to request funds for its Continuously Operating Reference Stations (an essential component of the NDGPS) in future budget requests.

This report was approved by the OST Secretarial Officers as well as the Office of Management and Budget and incorporates all changes and comments.

RECOMMENDATION

Sign the attached transmittal letters.

The Secretary

APPROVED: 

DISAPPROVED: _____

COMMENTS: _____

DATE: 5-18-01

State of North Carolina	3,000,000
South Carolina statewide	2,000,000
San Antonio, TX	200,000
Beaumont, TX	300,000
Corpus Christi, TX (vehicle dispatching)	1,500,000
Williamson County/Round Rock, TX	500,000
Austin, TX	500,000
Texas Border Phase I Houston, TX	1,000,000
Oklahoma statewide	2,000,000
Vermont statewide	1,000,000
Vermont rural ITS	1,500,000
State of Wisconsin	3,600,000
Tucson, AZ	2,500,000
Cargo Mate, NJ	1,000,000
New Jersey regional integration/TRANSCOM	4,000,000
State of Kentucky	2,000,000
State of Maryland	4,000,000
Sacramento to Reno, I–80 corridor	200,000
Washoe County, NV	200,000
North Las Vegas, NV	1,800,000
Delaware statewide	1,000,000
North Central Pennsylvania	1,500,000
Delaware River Port Authority	3,500,000
Pennsylvania Turnpike Commission	3,000,000
Huntsville, AL	2,000,000
Tuscaloosa/Muscle Shoals	3,000,000
Automated crash notification system, UAB	2,000,000
Oregon statewide	1,500,000
Alaska statewide	4,200,000
South Dakota commercial vehicle ITS	1,500,000

NATIONWIDE DIFFERENTIAL GLOBAL POSITIONING SYSTEM

Appropriations, 2000	($5,000,000)
Budget estimate, 2001	(18,700,000)
Committee recommendation [1]	

[1] Funding for NDGPS provided within FAA "facilities and equipment" account.

The administration has requested that $18,700,000 be provided for the fiscal year 2001 nationwide differential global positioning system (NDGPS) within the Federal Highway Administration's highway research and development program, using transferred revenue aligned budget authority. The Committee does not concur in the proposed RABA transfer, but has provided the requested NDGPS program funding within the Federal Aviation Administration's facilities and equipment account under the landing and navigational aids sub-account.

Of the recommended funding level of $18,700,000, $13,200,000 will be utilized for capital costs, and $5,500,000 will be spent for operating expenses. By the end of this calendar year, 23 decommissioned U.S. Air Force ground wave emergency network (GWEN) transmitting sites will have been converted to a differential GPS system and integrated into the nationwide network. DOT plans to establish an additional 28 sites in fiscal year 2001, and the remaining 16 sites to complete the national system will be established in fiscal year 2002. There is an estimated annualized operating cost of $6,900,000 for operating and maintaining the NDGPS.

The Committee has expressed concern over the last 2 years that, while system benefits directly accrue to the National Oceanic and Atmospheric Administration, and many other Federal, State and local agencies have public safety and mapping needs that will be indirectly aided by the availability of a differential GPS system,

DOT is the only Federal agency that requests appropriated funds for the development and operation of the NDGPS system. The Committee directs that a cost-sharing plan involving at least both DOT and the Department of Commerce be developed and conveyed to the House and Senate Committees on Appropriations no later than July 31, 2000, and that this cost-sharing plan be reflected in these two departmental budget requests for fiscal year 2002. The Committee will not support an ongoing commitment to annual operating costs for the NDGPS system if DOT remains the only Federal entity which directly supports those operations.

MAGNETIC LEVITATION TRANSPORTATION TECHNOLOGY DEPLOYMENT PROGRAM

(LIMITATION ON OBLIGATIONS)

(HIGHWAY TRUST FUND)

Appropriations, 2000	
Budget estimate, 2001	($20,000,000)
Committee recommendation (section 1218 funds)	(25,000,000)
Committee recommendation (section 3015(c) funds)	(25,000,000)
	(5,000,000)

Section 1218 of TEA21 provides $25,000,000 in highway trust funds contract authority for Maglev preconstruction activities in fiscal year 2001. Additionally, Section 3015(c) of TEA21 provides $5,000,000 from FHWA's technology deployment program for the development of low speed magnetic levitation technology in fiscal year 2001, bringing the total guaranteed contract authority available for maglev activities to $30,000,000.

The high speed maglev program is administered by the Federal Railroad Administration; the low speed maglev program is administered by the Federal Transit Administration. A total of $5,000,000 of the funds provided between fiscal year 1999 and 2001 in Section 1218 of TEA21 must be made available for research and development of low speed magnetic levitation for urban public transportation purposes. Thus far, $2,000,000 of the high speed maglev program funds have been transferred to FTA for the low speed urban maglev program. Therefore, in fiscal year 2001, FTA will receive directly or be transferred a total of $8,000,000 for low speed maglev development ($3,000,000 from Section 1218 and $5,000,000 from Section 3015(c)). The Federal Railroad Administration will be transferred $22,000,000 for the deployment of high speed maglev projects. This is the final year of guaranteed contract authority funding for the high speed maglev program under the TEA21 authorization cycle.

High-speed maglev deployment program.—The administration has requested that $2,000,000 of the Section 1218 funds be made available for FRA's administration of the high speed maglev program. The Committee recommendation provides $25,000,000 for the high speed magnetic levitation technology deployment program, of which not more than $1,000,000 shall be available to the Federal Railroad Administration for administrative expenses and technical assistance. Within the high speed maglev program funds made available for fiscal year 2001, the Committee recommends the following amounts be ma
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Appropriations, 2000 [1] .....
Budget estimate, 2001 .....
Committee recommendation ...

[1] Excludes reduction of $182,000

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